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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Christopher John Evans

Serial No: 10/604,002 Group Art No. 2859

Filed: June 20, 2003 Examiner: Louis M. Arana

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED
FRINGE-FIELD

Attorney Docket No: GEMS 0197 PA

I hereby certify that this correspondence is being deposited with the United States Patent Office as first-class mail in an envelope addressed to: Mail Stop Petitions, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on:

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Louis M. Arana
Signature

REQUEST FOR WITHDRAWAL OF ABANDONMENT

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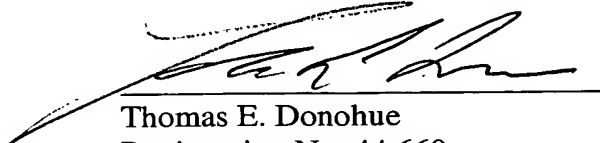
This information is being submitted after Applicant has learned of abandonment on the basis of a Notice of Abandonment mailed October 5, 2004.

The undersigned attests that the response to the Office Action dated February 17, 2004, was submitted on May 17, 2004, in a timely manner. A copy of the Amendment Under 37 CFR §1.111 and Auto-Reply Facsimile Transmittal are submitted herewith.

Acknowledgment of the active status of this application is respectfully requested.

The Commissioner is authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account No. 07-0845.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read 'T. Donohue', is written over a horizontal line.

Thomas E. Donohue
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Attorney for Applicant

Date: November 24, 2004



Auto-Reply Facsimile Transmission



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Christopher John Evans

Serial No.: 10/604,402

Group Art Unit: 2859

Filed: 6/20/2003

Examiner: Louis M. Arana

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED FRINGE-FIELD

Attorney Docket No.: GEMS 0197 PUS

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AMENDMENT UNDER 37 CFR 1.111

Box Non-Fee Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This paper is in response to the first Office Action in the above-entitled application, mailed February 17, 2004, and allowing three months for response. This response is timely because it is being filed within the three month period set for response.

Please amend the above-identified application as follows:



MODE = MEMORY TRANSMISSION

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Christopher John Evans

Serial No.: 10/604,402 Group Art Unit: 2859

Filed: 6/20/2003 Examiner: Louis M. Arana

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED FRINGE-FIELD

Attorney Docket No.: GEMS 0197 PUS

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John A. Hertz
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AMENDMENT UNDER 37 CFR § 1.111

Box Non-Fee Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This paper is in response to the first Office Action in the above-entitled application, mailed February 17, 2004, and allowing three months for response. This response is timely because it is being filed within the three month period set for response.

Please amend the above-identified application as follows:



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Christopher John Evans

Serial No.: 10/604,402

Group Art Unit: 2859

Filed: 6/20/2003

Examiner: Louis M. Arana

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED FRINGE-FIELD

Attorney Docket No.: GEMS 0197 PUS

I hereby certify that this correspondence is being deposited with the United States Postal Service via facsimile to (703) 872-9306 on:

5/17/2004
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Ken A. Haro
(Signature)

AMENDMENT UNDER 37 CFR § 1.111

Box Non-Fee Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This paper is in response to the first Office Action in the above-entitled application, mailed February 17, 2004, and allowing three months for response. This response is timely because it is being filed within the three month period set for response.

Please amend the above-identified application as follows:

IN THE CLAIMS

1. (Currently Amended) An imaging system comprising:
A primary gradient coil assembly; and
A shield coil assembly connected in series to said primary gradient coil assembly, said shield coil assembly comprising:
a first gradient shield coil; and
a second gradient shield coil connected in parallel to said first gradient shield coil;
a pair of voltage rails in communication with said first gradient shield coil and said second gradient shield coil;
a first subcircuit in communication with said first gradient shield coil;
and
a second subcircuit in communication with said second gradient shield coil, said first subcircuit and said second subcircuit independently adjustable such that the currents through said first gradient shield coil and said second gradient shield coil may be independently adjusted.
2. (Original) An imaging system as in claim 1 further comprising
at least one additional gradient shield coil connected in parallel to said first gradient shield coil and said second gradient shield coil.
3. (Currently Amended) An imaging system as in claim 1 wherein said first subcircuit and said second subcircuit are adjusted such that said first gradient shield coil has a resistance equal to said second gradient shield coil.
4. (Currently Amended) An imaging system as in claim 1 wherein:
said first gradient shield coil comprises a plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, said plurality of second shield winding turns having a non-identical ~~the same~~ number of turns as said plurality of first shield winding turns.

5. (Original) An imaging system as in claim 1 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns and a plurality of winding gaps, each of said plurality of winding gaps formed between consecutive turns of said plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, each of said plurality of second shield winding turns positioned within one of said winding gaps.

6. (Original) An imaging system as in claim 5 wherein said plurality of first shield winding turns and said plurality of second shield winding turns are positioned within a single winding plane.

7. (Original) An imaging system as in claim 1 wherein said shield coil assembly comprises a plurality of winding turns formed in an asymmetrical pattern.

8. (Original) An imaging system as in claim 1 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns forming a first sub-coil;

said second gradient shield coil comprises a plurality of second shield winding turns forming a second sub-coil, said second sub-coil positioned linearly adjacent to said first sub-coil and positioned within a single winding plane.

9. (Currently Amended) An imaging system comprising:

A primary gradient coil assembly; and

A shield coil assembly surrounding said primary gradient coil assembly, said shield coil assembly comprising:

a first gradient shield coil; and

a second gradient shield coil connected in parallel to said first gradient shield coil;

a pair of voltage rails in communication with said first gradient shield coil and said second gradient shield coil;

a first subcircuit in communication with said first gradient shield coil;
and

a second subcircuit in communication with said second gradient shield coil, said first subcircuit and said second subcircuit independently adjustable such that the currents through said first gradient shield coil and said second gradient shield coil may be independently adjusted;

wherein said shield coil assembly comprises a plurality of winding turns formed in an asymmetrical pattern.

10. (Original) An imaging system as in claim 9 further comprising

at least one additional gradient shield coil connected in parallel to said first gradient shield coil and said second gradient shield coil.

11. (Currently Amended) An imaging system as in claim 9 wherein said first subcircuit and said second subcircuit are adjusted such that said first gradient shield coil has a resistance equal to said second gradient shield coil.

12. (Currently Amended) An imaging system as in claim 9 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, said plurality of second shield winding turns having a non-identical ~~the same~~ number of turns as said plurality of first shield winding turns.

13. (Original) An imaging system as in claim 9 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns and a plurality of winding gaps, each of said plurality of winding gaps formed between consecutive turns of said plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, each of said plurality of second shield winding turns positioned within one of said winding gaps.

14. (Original) An imaging system as in claim 9 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns forming a first sub-coil;

said second gradient shield coil comprises a plurality of second shield winding turns forming a second sub-coil, said second sub-coil positioned linearly adjacent to said first sub-coil and positioned within a single winding plane.

15. (Original) An imaging system as in claim 13 wherein said plurality of first shield winding turns and said plurality of second shield winding turns are positioned within a single winding plane.

16. (Cancelled) An imaging system as in claim 9 wherein said shield coil assembly comprises a plurality of winding turns formed in an asymmetrical pattern.

17. (Currently Amended) A method of reducing the fringe field generated by a primary gradient coil assembly comprising:

running a first current through a first gradient shield coil connected in parallel to the primary gradient coil assembly; and

running a second current through a second gradient shield coil connected in series to the primary gradient coil assembly, said second gradient shield coil connected in parallel to said first gradient shield coil;

adjusting said first current and said second current independently to minimize the fringe field.

18. (Cancelled) A method as described in claim 17, wherein said first current is equal to said second current.

19. (Cancelled) A method as described in claim 17, further comprising:

adjusting said first current and said second current independently to minimize the fringe field.

20. (Original) A method as described in claim 17, wherein said first current and said second current are passed through an equal number of winding turns.

21. (Original) A method as described in claim 17, wherein said first gradient shield coil and said second gradient shield coil share a single winding plane.

REMARKS

Claims 1-21 are pending in the above application. Claims 1-21 were rejected under 35 USC 102 (a) as being anticipated by Joseph (US 6,456,076).

Claims 1-21 rejected under 35 USC 102 (a)

Claims 1-21 were rejected under 35 USC 102 (a) as being anticipated by Joseph (US 6,456,076). The Office Action asserts that the Joseph reference teaches all of the limitations of the present invention. The Applicant respectfully disagrees and requests reconsideration in light of the aforementioned amendments and the present arguments.

A novel inventive aspect of the present invention was its ability to handle multiple (more than two) shield windings sharing a similar plane. It was recognized in paragraph 32 of the specification that matched windings and winding length may not be feasible using multiple shield coils. Therefore, the present invention addresses a concern and failing not addressed by Joseph. By including independently controllable sub-circuits, the present invention can independently control currents through the shield coils (even though they are in parallel). This provides a much greater flexibility of coil selection that taught by Joseph. In addition, it paves the way for the claimed asymmetrical windings claimed by the present invention (see Claim 6 and Claim 9). This feature is not taught by Joseph and is particularly adapted to the present invention since variations in shield windings generated by the asymmetric format can be independently adjusted using the structure of the present invention. Thus the present invention contains limitations not taught, rendered obvious, or even considered by Joseph.

In addition, the present invention claims an additional (or third) shield coil in parallel with the others and in series with the gradient (see Claim 2). This should not be quickly dismissed as obvious. The increase in number of shield coils in parallel significantly impacts the variations generated in field by each shield when they are not exactly matched in windings and length. This concern is not addressed by Joseph. The present invention makes such expanded shielding scenarios possibly where previously impractical due to the independent control over each shielding set.

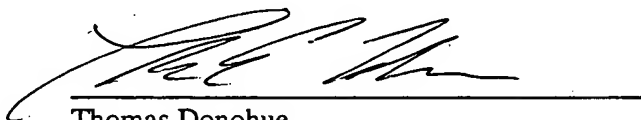
The Applicant respectfully requests reconsideration in light of the aforementioned amendments and remarks.

CONCLUSION

The Applicant would like to thank the Examiner for his assistance. In light of the above amendments and remarks, Applicant submits that all objections and rejections are now overcome. Applicant has added no new material to the application by these amendments. The application is now in condition for allowance and expeditious notice thereof is earnestly solicited.

Should the Examiner have any questions or comments that would place the application in better condition for allowance, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,



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Dated: May 17, 2004